DOCUMENT RESUME

ED 190 092 IR 008 573

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TITLE Characterizing the Industrial Special Library Universe--II.
PUB DATE May 80
NOTE 51p.: Not available in paper copy because of poor print quality in tables on pages 8-17 and A2-A21.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Industry; Library Education; *Library Expenditures; *Research and Development Centers; *Special Libraries; *Statistical Surveys; Students

ABSTRACT

This report presents supplementary statistical information characterizing industrial special libraries and backs up conclusions made in the journal article of the same title appearing in the May 1980 issue of the Journal of the American Society for Information Science (JASIS); this in turn updates an article published in May 1977. JASIS publications priorities in 1980 prevented publication of the full statistical information presented here, which must be used in conjunction with the article and is referenced to it. This study argues that Fortune "500" industry groups are superior to those of Business Week "600" in delineating the industrial special library universe; the reclassified BW "600" figures for R&D expenditures can show that corporations with libraries spend five times as much on R&D as those without them; and that the per capita expenditures for the former corporations have a mean of $1,006 annually as compared to $615 for corporations without libraries. Thirteen tables and two sub-tables detail the expenditures for industry groups in 1978 Fortune "500," 1975 Fortune "500," and their equivalents for BW "600" corporations. This database is considered appropriate for library school student practice in the application of the Statistical Program for the Social Sciences. (Author/RAA)

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CHARACTERIZING THE INDUSTRIAL SPECIAL LIBRARY UNIVERSE -- II

by

Eugene and Ruth Jackson

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

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One of the referees for the original manuscript of our article "Characterizing the Industrial Special Library Universe" wrote that such figures as included were "desparately needed" by the special library community but that space limitations in the Journal of the American Society for Information Science precluded their being given in sufficient detail for maximum usefulness. As we revised the manuscript to the form published, the thought occurred to us that the realistic solution was to provide such statistical detail via a supplementary report to be submitted to ERIC.

Accordingly the article as published in May 1980[1] emphasized the portions of that Universe as were found most significant in the original JASIS article of May 1977:[2] the Industry Groups used by FORTUNE in issuing its annual compilation of the "500" leading corporations, and, specifically the core Groups for Chemicals, Electronics. Petroleum Refining, Pharmaceuticals, Aerospace, Office Equipment, Food, Measuring, Scientific...Equipment, Metal Manufacturing, Motor Vehicles, Industrial & Farm Equipment and Metal Products. Whatever we were measuring, these twelve groups invariably had an overwhelming share of it -- and Figures, 1, 2, and 3 of the 1980 article limited themselves to the 12 groups to save space.

Basically the two new "ingredients" in the later article were a) the updating of the FORTUNE "500" results for 1975 to those for 1978 and b) the consideration of whether the Business Week[3] annual listings of the 600 leading corporations on the basis of their expenditures for R&D (Research and Development)

would give equal or superior results to the FORTUNE "500" Industry Groupings. Assuming that the reader has Reference 1 at hand, it may be seen graphically in Figures 1, 2 and 3 that there were insignificant changes in the results from 1978 FORTUNE "500" tabulations as compared to those for 1975. Further, that the BW "600" results followed similar curves to the FORTUNE "500" ones with those corporations having libraries spending at least five times as much for R&D as those without libraries. The FORTUNE Industry Groups previously shown to be prestigious components of the special library universe are even more so when the variable is R&D expenditures of their host corporations. To underline this fact we decided to show by a dashed line at the left side of each table in this ERIC report a separation between the "Big 12" groups and the remainder of the population.

The List of Tables appearing on the next page show where the statistical backup for our summarizing statements relating to R&D expenses may be found.

Beginning with Figure 1 of the 1980 article and Table 7, we note that the 12 Industry Groups for 1978 FORTUNE "500" shown represent 92.5% of the $15,525.7 Million total expended, with the remaining 10 Groups accounting for only $1,154 Million (7.4%). Similarly for the 1975 FORTUNE "500" figures from Table 1, the "Big 12" account for 92.9% of the $13,534 Million expended and the remainder account for $957 Million (7.1%).

If one were to ignore that $837 Million shown by BW as in telecommunications and other splinter groups not fully equivalent to those in FORTUNE, then $957 Million is seen from Table 5

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*Line number as shown in Figure 1, 2 or 3 in 1980 JASIS article

as being generally equivalent to FORTUNE Groups. Then the bottom 12 Groups in the BW table represents 15% of that $957 Million total, while the FORTUNE equivalents represent 85% -- still a very respectable showing for the "Big 12".

Proceeding to considering those corporations without libraries and related Tables 3 and 9, we see that the much smaller totals of $583.8 Million for 1978 FORTUNE "500" and $543.6 Million for 1975 FORTUNE "500" include 85.3% and 87% respectively as the "Big 12" shares. The remaining 10 Groups share $86 Million for 1978 and $71 Million for 1975. (The BW figures remain the same as the representation was so small that a check was not made as to which BW corporations had libraries). The clear edge of the FORTUNE "500" corporations with libraries whereby they spent five times as much on R&D as did those without libraries is the most significant finding of this R&D expenditure study.

Looking for any light shed by considering the Means (Averages) of R&D costs, Figure 3 and Tables 2, 4, 6, 8, and 10 are relevant. Briefly, the 1978 FORTUNE "500" Means are $55.5 Million per Group for those with libraries and $8.2 Million for those without while the 1975 FORTUNE "500" Group figures are $51.2 Million and $10.2 Million respectively. Thus the differences are widening in favor of those with libraries. The Means for the Groups below the dotted lines were $21 Million and $7 Million for 1978 as compared to $16 Million and $6 Million respectively for 1975. The BW overall Group Mean was $10.3 Million, with those below the dotted line averaging $3 Million. Thus, the Means of R&D expenditures merely

confirm previous impressions on differences between corporations with libraries and those without.

While we personally prefer to know the costs per professional employee in establishing "reasonable" levels of library support, Tables 2, 4, 6, 8, 10 and 12 give us a first look at what the Mean R&D costs are per employee. A procedure for converting the latter to our preferred form is not yet clear but would be very useful, indeed.

To summarize what is now available from the Tables just cited, the 1978 FORTUNE "500" corporations with libraries averaged the easily remembered figure of $1,006 per employee per year, the 1978's without averaged $618, the 1975's with spent $943 while the withouts spent $615 and the BW figure was $1,074.

Applying our Conclusion (4) from the 1980 JASIS article that "One percent or less of the total spent for private R&D by leading industrial corporations goes to special library materials and services annually" (p.214) then one could estimate that those corporations should plan on spending $100 per year per employee on special library materials and services. That is lower than another and preferred figure we have used of setting aside a sum equivalent to the annual expenditures for wire communications to use for library materials and services.

The search for the "magic formula" for library support by higher administrators was clearly not answered by this present study of R&D expenditures of corporations. However, a body of comparative information has been made available for the first time that special library/information center managers may apply

as best serves their particular corporate setting.

An additional "bonus value" of the data base detailed in this ERIC report is the possibility of it being used as a manageable body for analysis by library school students using the widely available SPSS Program (Statistical Package for the Social Sciences) as was used for the results we reported in considerable detail in the 1977 JASIS article. We would be interested in learning of any such use of this R&D expenditures information by students or colleagues.

A final bonus is provided via Table 13 which as its title indicates is a negative Industrial Special Library Universe -- a listing of those 1978 FORTUNE "500" corporations without libraries. Some questions raised in the 1977 JASIS article on "How Can This Be?" are still unanswered.

References

1. Jackson, E. B.; Jackson, R. L. "Characterizing the Industrial Special Library Universe." Journal of the American Society for Information Science 31 (May 1980) 208-214.
2. Jackson, E.B.; Jackson, R.L. "The Industrial Special Library Universe -- A 'Base Line' Study of Its Extent and Characteristics." Journal of the American Society for Information Science 28 (May 1977): 135-152.
3. "What 600 Companies Spend for Research" Business Week No. 2489 (June 27, 1977):62-84.

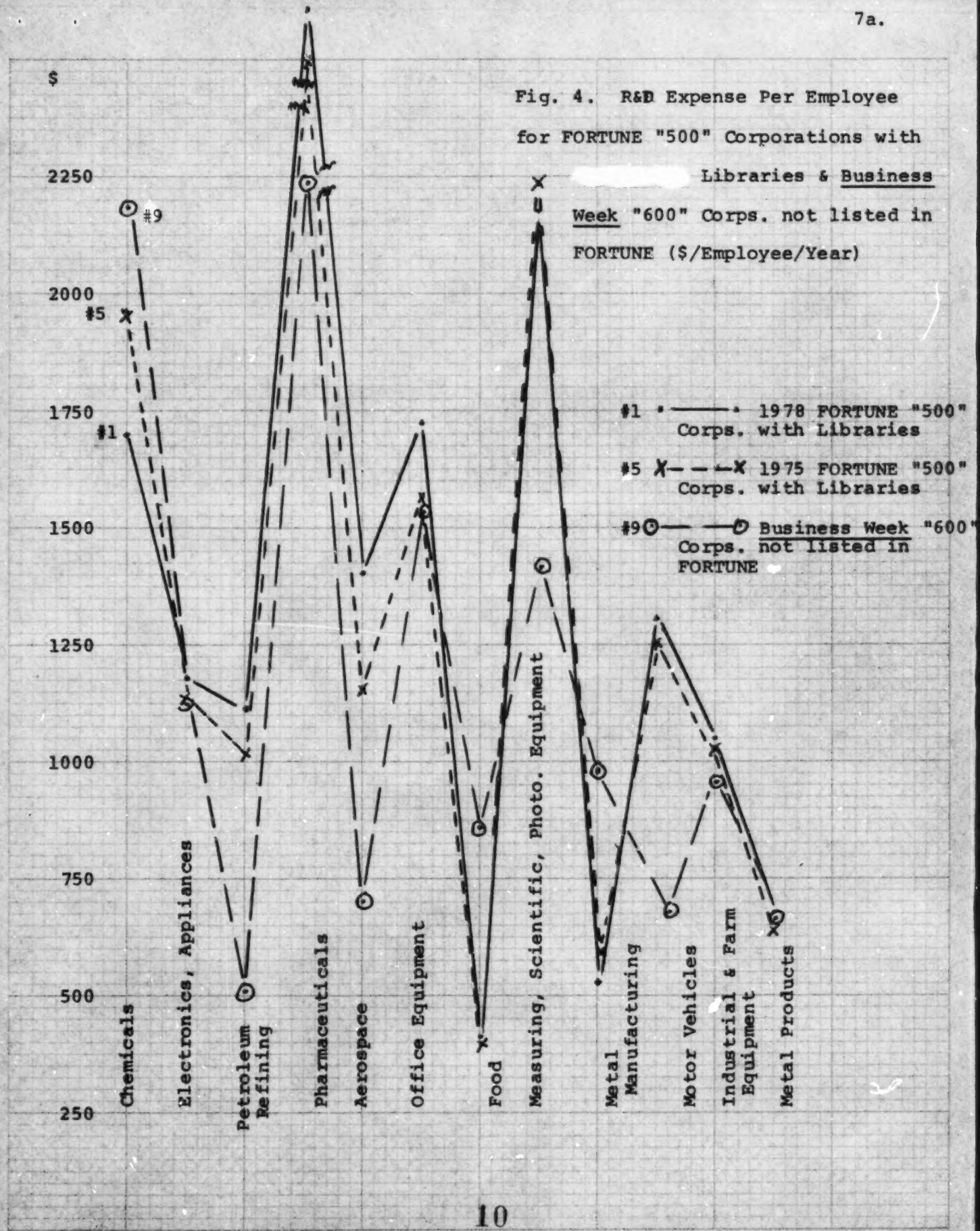

Fig. 4. R&D Expense Per Employee for FORTUNE "500" Corporations with [redacted] Libraries & Business Week "600" Corps. not listed in FORTUNE ($/Employee/Year)

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Table 1. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations

(Data for Line #5 in Fig. 1, JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense * 1976 Millions of Dollars	Percent change from 1975 (range)	Percent of sales (range)	Percent of profits (range)	Dollars per employee (range)
16 Chemicals	27	1,376.7	21.6 - (-26.4)	4.2 - 0.8	315.1 - 15.9	4,789 - 471
13 Appliances, electronics	26	1,685.4	87.9 - (-21.8)	9.9 - (0.8)	266.7 - 18.2	3,372 - 204
32 Petroleum refining	16	744.7	51.9 - (-37.3)	0.7 - 0.2	17.6 - 3.2	2,020 - 377
33 Pharmaceuticals	18	1,164.4	26.0 - (-6.4)	9.0 - 2.4	194.0 - 2.4	3,038 - 1,263
11 Aircraft	14	936.2	64.1 - (-48.5)	6.9 - 0.7	227.7 - 24.2	2,921 - 236
30 Office machinery	9	1,641.5	19.5 - (-14.1)	6.2 - 1.7	38.1 - (-14.1)	3,466 - 611
18 Food	23	277.3	45.1 - (-4.9)	1.3 - 0.2	95.8 - 4.8	1,170 - 211
23 Measuring, scientific, photographic equipment	8	874.0	20.8 - 3.8	6.5 - 3.1	221.9 - 46.5	5,348 - 933
24 Metal manufacturing	11	232.5	40.9 - (-16.4)	1.7 - 0.3	184.0 - 10.4	1,130 - 203
28 Motor vehicles	9	2,806.1	40.9 - 2.7	3.4 - 1.3	130.3 - 27.7	2,084 - 421
17 Farm & industrial machinery	17	622.2	53.2 - (-16.9)	4.1 - 0.6	131.1 - 12.0	2,415 - 232
25 Metal products	8	167.3	897.5 - 0.0	2.3 - 0.5	54.3 - 6.6	992 - 313
20 Glass, concrete, abrasives, gypsum	12	228.2	32.3 - (-6.4)	4.8 - 0.5	538.3 - 5.1	1,640 - 342
31 Paper, fiber & wood products	13	147.1	44.4 - (-6.7)	2.3 - 0.2	64.8 - 3.4	1,272 - 94
37 Soaps, cosmetics	6	205.4	26.7 - 5.7	2.1 - 0.4	34.1 - 8.0	2,627 - 393
35 Rubber, plastic products	5	284.6	3.6 - (-41.1)	2.5 - 0.8	293.1 - 15.9	1,092 - 417
14 Beverages	2	10.9	34.1 - (-2.9)	3.3 - 0.2	3.4 - 3.2	279 - 210
38 Textiles	4	11.3	5.1 - (-1.1)	0.3 - 0.2	10.8 - 3.7	143 - 68
39 Tobacco	2	19.0	11.8 - 0.2	0.6 - 0.5	12.5 - 10.5	559 - 534
36 Shipbuilding, railroad & transportation equipment	2	11.6	34.4 - 17.0	0.6 - 0.4	25.7 - 11.1	291 - 269
29 Musical instruments, toys & sporting goods	1	9.5	9.5	0.9	25.0	316
27 Miscellaneous Manufacturing	1	24.5	11.4	2.5	46.9	1,065
26 Mining	1	3.8	-7.5	1.2	66.3	722
GRAND TOTAL	235	13,534.0				

* BW, June 27, 1977

Table 1. Mean (Average) Research and Development Expense of Those 1975 FORTUNE 500 Corporations with Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Data for Line #6 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense * 1976 Millions of Dollars	Percent change from 1975	Percent of sales	Percent of profits	Dollars per employee
16 Chemicals	27	50.99	9.29	2.30	52.61	1,964.70
13 Appliances, electronics	26	64.82	13.07	3.33	73.48	1,154.08
32 Petroleum refining	16	43.81	9.67	0.41	7.52	1,017.88
33 Pharmaceuticals	18	64.69	14.02	5.31	70.35	2,572.00
11 Aircraft	14	70.44	9.03	2.55	78.46	1,156.50
30 Office machinery	9	182.39	4.98	4.12	120.17	1,366.11
18 Food	23	12.06	19.52	0.54	18.26	402.95
23 Measuring, scientific, photographic equipment	8	109.25	9.89	5.09	79.99	2,221.25
24 Metal manufacturing	11	21.14	12.65	0.95	36.22	585.00
28 Motor vehicles	9	311.79	17.57	2.94	87.43	1,253.78
17 Farm & industrial machinery	17	36.60	13.37	2.11	48.25	1,028.47
25 Metal products	8	20.91	119.40	1.31	31.37	610.75
20 Glass, concrete, abrasives, gypsum	12	19.02	14.24	1.63	75.14	736.83
31 Paper, fiber & wood products	13	11.32	13.77	0.89	19.28	531.77
37 Soaps, cosmetics	6	34.23	14.16	1.13	17.13	853.83
35 Rubber, plastic products	5	56.92	-7.46	1.76	144.60	760.20
14 Beverages	2	5.54	15.60	0.25	3.30	244.50
38 Textiles	4	2.83	1.98	0.38	6.73	92.50
39 Tobacco	2	9.50	5.80	0.55	11.50	546.50
36 Shipbuilding, railroad & transportation equipment	2	5.80	25.70	0.50	18.40	280.00
29 Musical instruments, toys & sporting goods	1	9.50	9.50	0.90	25.00	314.00
27 Miscellaneous manufacturing	1	24.50	11.40	2.50	46.90	1,065.00
26 Mining	1	3.60	-7.50	1.20	66.30	722.00
GRAND TOTAL	235					
MEAN OF MEAN		51.18	15.22	1.84	49.45	942.72

* BW, June 27, 1977

Table 3.

(Data for Line #7 in Fig. 2, JASIS Article)

Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations without Libraries

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	R & D Expense * Percent change from 1975 (range)	Percent of sales (range)	Percent of profits (range)	Dollars per employee (range)
16 Chemicals	3	17.1	48.2 - 1.2	1.3 - 0.6	35 - 19	863 - 821
13 Appliances, electronics	9	102.6	57.3 - (-3.3)	3.7 - 0.5	192.8 - 9.0	1,353 - 212
30 Office machinery	1	58.4	20.3	7.9	79.5	2,336
18 Food	4	24.9	16 - 0.3	1.2 - 0.1	18.5 - 5.7	379 - 78
43 Measuring, scientific, photographic equipment	1	3.2	0.2	0.9	31.1	326
24 Metal manufacturing	7	17.5	115.3 - (-9.4)	0.9 - 0.3	99.1 - 4.4	290 - 104
28 Motor vehicles	6	91.1	32.8 - (-24.8)	1.7 - 0.7	157.3 - (-83.8)	1,243 - 261
17 Farm & industrial machinery	15	130.2	39.3 - (-20.9)	2.3 - 0.5	80.8 - 7.2	1,592 - 236
25 Metal products	7	27.0	38.4 - (-17.0)	2.2 - 0.4	44.9 - 5.1	769 - 160
20 Glass, concrete, abrasives, gypsum	1	1.4	19.8	0.2	5.1	109
31 Paper, fiber & wood products	4	16.1	13.4 - (-2.4)	0.9 - 0.2	33.1 - 6.6	533 - 164
35 Rubber, plastic products	1	6.6	21.0	1.3	53.3	591
38 Textiles	2	10.2	13.0 - 5.7	1.4 - 0.8	40.1 - 37.5	433 - 306
36 Shipbuilding, railroad & transportation equipment	1	4.1	31.1	1.0	40.1	510
29 Musical instruments, toys & sporting goods	2	33.2	29.5 - 6.8	2.6 - 2.5	61.8 - 55.1	974 - 915
GRAND TOTAL	64	543.6				

* BW, June 27, 1977

Table 4. Mean (Average) Research and Development Expense of Those 1975 FORTUNE 500 Corporations without Libraries

(Data for Line #8 in Fig.3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent change from 1975	R & D Expense * Percent of sales	Percent of profits	Dollars per employee
16 Chemicals	3	5.7	21.4	0.9	28.13	841.33
13 Appliances, electronics	9	11.4	19.17	1.34	50.4	642.11
30 Office machinery	1	58.4	20.3	7.9	79.3	2,336.00
18 Food	4	6.23	9.58	0.38	10.68	192.75
23 Measuring, scientific, photographic equipment	1	3.2	0.2	0.9	31.1	326.00
24 Metal manufacturing	7	2.5	26.94	0.5	24.8	183.86
28 Motor vehicles	6	15.18	7.35	1.17	26.15	746.17
17 Farm & industrial machinery	15	8.68	11.09	1.48	29.88	673.27
25 Metal products	7	3.86	14.28	1.01	21.46	433.14
20 Glass, concrete, abrasives, gypsum	1	1.4	19.8	0.2	5.1	109.00
31 Paper, fiber & wood products	4	4.03	5.6	0.6	18.73	328.25
35 Rubber, plastic products	1	6.6	21.0	1.3	33.3	391.00
38 Textiles	2	5.1	9.35	1.1	38.8	369.50
36 Shipbuilding, railroad & transportation equipment	1	4.1	31.1	1.0	40.1	310.00
29 Musical instruments, toys & sporting goods	2	16.6	18.15	2.55	38.45	944.50
GRAND TOTAL	64					
MEAN OF MEAN		10.20	15.70	1.49	34.43	615.13

* BW, June 27, 1977

Table 3. Total Research and Development Expense of those 1976 Business Week Corporations not Listed in FORTUNE 500 (Arranged in Same Order as Tables 1-8)

(Data for Line #9 in Figs. 1 & 2, JMSIS Article)

Equivalent FORTUNE Industry Group # & Name (BW names in Curves)	# of Corps. Represented	1976 Millions of Dollars	Percent change from 1975 (range)	R & D Expense per BW, June 27, 1977: Percent of sales (range)	Percent of profits (range)	Dollars per employee (range)
16 Chemicals (same)	12	43.1	34.6 - 3.4	4.0 - 1.5	134.2 - 19.5	3584 - 1122
13 Appliances, electronics (Appliances, electrical, electronics)	38	187.6	59.1 - (-33.6)	9.6 - 0.3	264.8 - (-60.5)	2600 - 186
32 Petroleum refining (closest category to BW's Oil and Service supply)	9	98.3	191.3 - 10.2	3.3 - 0.2	169.7 - 1.3	1340 - 96
33 Pharmaceuticals (Drugs)	14	107.0	48.2 - (-11.4)	8.6 - 1.5	1621.5 - 18.5	3889 - 644
11 Aircraft (Aerospace)	2	3.4	6.8 - 1.8	3.0 - 0.6	71.0 - 11.8	1124 - 274
30 Office machinery (Office equipment, computers)	19	88.8	102.3 - (-33.0)	10.7 - 0.9	210.6 - (-625.0)	3592 - 366
18 Food (Food, beverages)	5	11.8	123.4 - (-3.9)	1.8 - 0.4	60.1 - 8.2	2009 - 323
23 Measuring, scientific, photographic equipment (Instruments)	31	126.7	106.1 - (-16.3)	9.8 - 0.5	382.5 - (-173.0)	3819 - 137
24 Metal manufacturing (Steel)	3	10.6	12.5 - (-15.1)	2.8 - 1.2	43.8 - 18.8	1684 - 473
28 Motor vehicles (Automotive)	11	28.5	38.8 - (-6.2)	4.3 - 0.8	74.1 - 21.4	1207 - 237
17 Farm & industrial machinery (General machinery)	21	66.9	346.3 - (-28.4)	6.8 - 0.6	282.2 - (-24.8)	2580 - 242
25 Metal products (Closest category to BW's Miscellaneous manufacturing)	25	51.7	90.3 - (-18.8)	3.2 - 0.6	173.0 - (-123.7)	2869 - 192
20 Glass, concrete, abrasives, gypsum (Building Materials)	8	26.4	46.3 - (-7.8)	3.5 - 0.4	260.7 - 9.9	2422 - 272
31 Paper, fiber and wood products (Paper)	2	3.9	20.2 - (-16.7)	3.2 - 0.7	75.1 - 8.9	1409 - 395
37 Soaps, cosmetics (Personal Care Products)	6	28.6	27.3 - 6.7	5.9 - 0.8	60.6 - 15.7	5209 - 490
35 Rubber, plastic products (Tires and Rubber)	8	22.3	31.8 - (-0.5)	2.3 - 0.8	75.1 - 7.3	973 - 642
14 Beverages see 18 Food						
38 Textiles (Textiles, Apparel)	4	7.6	144.8 - (-0.2)	3.6 - 0.5	50.3 - 13.2	1129 - 199
39 Tobacco (None)						
36 Shipbuilding, railroad & transportation equipment (none)						
29 Musical instruments, toys & sporting goods (Leisure Time)	11	32.8	176.1 - (-15.2)	3.0 - 0.9	131.6 - 17.3	2432 - 317
26 Mining (Metals and Mining)	7	26.5	24.5 - (-17.9)	7.7 - 0.4	13069.3 - (-89.4)	3000 - 298
— None (Service Industries)	13	48.9	72.2 - (-9.0)	8.0 - 0.1	472.8 - (-187.2)	4183 - 98
— None (Telecommunications)	5	775.1	41.6 - (-4.6)	5.0 - 0.9	23.3 - 11.8	5662 - 396
— None (Conglomerates)	1	1.2	135.7	1.0	19.4	342
— None (Special Machinery)	4	11.1	43.5 - 7.4	2.5 - 1.4	60.6 - (-96.7)	1452 - 712
GRAND TOTAL	267	1808.8				

Table 6. Mean (Average) Research and Development Expense of those 1976 Business Week Corporations not Listed in FORTUNE 500 (Arranged in Same Order as Tables 1 - 8)

(Data for Line #10 in Fig. 3, JASIS Article)

Equivalent FORTUNE Industry Group # & Name (BW name in Curves)	# of Corps. Represented	1976 Millions of Dollars	Percent change from 1975	R & D Expense per BW, June 27, 1977 Percent of sales	Percent of profits	Dollars per employee
16 Chemicals (Same)	12	3.59	15.16	2.6	50.56	2,184
13 Appliances, electronics (Appliances Electrical, Electronics)	38	4.69	11.46	3.37	79.27	1,124.47
32 Petroleum refining (Closest category to BW's Oil and Service Supply)	9	10.92	40.83	1.47	29.16	503.11
33 Pharmaceuticals (Drugs)	14	7.64	19.75	4.37	169.98	2,240.5
11 Aircraft (Aerospace)	4	1.7	4.3	1.8	41.0	699
30 Office machinery (Office Equipment, Computers)	19	4.67	18.94	4.13	24.05	1,528.32
18 Food (Food, Beverages)	5	2.36	34.3	1.0	28.64	852.8
23 Measuring, scientific, photographic equipment (Instruments)	31	4.09	18.35	3.82	71.5	1416.58
24 Metal manufacturing (Steel)	3	3.53	1.3	1.9	28.3	977.33
28 Motor vehicles (Automotive)	11	3.59	10.18	1.82	41.12	674.91
17 Farm and industrial machinery (General Machinery)	21	3.18	25.8	2.44	58.72	956.66
25 Metal products (closest category to BW's Miscellaneous Manufacturing)	25	2.07	15.69	1.47	40.02	649.84
20 Glass, concrete, abrasives, gypsum (Building Materials)	8	3.3	14.94	2.14	102.53	1293.37
31 Paper, fiber & wood products (Paper	2	1.95	1.75	1.95	42.0	902.0
37 Soaps, cosmetics (Personal	6	4.77	16.87	2.12	47.92	1611.5
35 Rubber, plastic products (Tires and Rubber)	8	2.78	7.93	1.31	40.83	690.9
14 Beverages see Food						
38 Textiles (Textiles, Apparel)	4	1.9	30.45	1.55	30.23	716.5
39 Tobacco (None)						
36 Shipbuilding, railroad and transportation equipment (None)						
29 Musical instruments, toys & sporting goods (Leisure Time)	11	2.98	44.8	2.32	50.37	868.18
26 Mining (Metals and Mining)	7	3.78	5.8	2.78	1,892.67	1,148.28
— None (Service Industries)	19	2.57	18.1	2.19	67.55	970.57
— None (Telecommunications)	5	155.02	15.7	2.14	17.5	1,152.2
— None (Conglomerates)	1	1.2	135.7	1.0	39.4	362.0
— None (Special Machinery)	4	2.77	27.02	1.97	13.07	1,179.75
GRAND TOTAL	267					
MEANS OF MEANS		10.26	24.14	2.25	130.54	1,074.34

Table 7. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Data for Line #1 in Fig. 1, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	R & D Expense * Percent change from 1976 (range)	Percent of sales (range)	Percent of profits (range)	Dollars per employee (range)
28 Chemicals	36	1,645.9	26.6 - (-3.4)	4.0 - 0.4	261.8 - (-109.7)	5,306 - 458
36 Electronics, appliances	23	1,666.5	37.1 - (-6.4)	9.5 - 0.8	421.5 - 14.9	3,847 - 235
29 Petroleum refining	16	805.9	37.6 - (-8.0)	0.9 - 0.1	12.[illegible] - 3.4	2,713 - 172
42 Pharmaceuticals	17	1,257.5	17.1 - 2.3	9.0 - 2.5	148.5 - 21.5	5,431 - 1,242
41 Aerospace	11	1,024.6	37.1 - (-9.7)	6.6 - 0.4	187.9 - 5.9	2,904 - 238
44 Office equipment	10	1,941.6	36.5 - 5.9	7.5 - 0.8	122.7 - (-34.4)	3,682 - 248
20 Food	27	309.9	31.8 - (-19.5)	1.2 - 0.2	35.6 - 5.4	1,135 - 145
38 Measuring, scientific, photographic equipment	14	1,192.7	30.1 - 3.1	9.2 - 2.0	213.5 - 31.4	5,426 - 507
33 Metal manufacturing	11	242.4	145.2 - (-34.9)	1.5 - 0.2	4392.3 - (-83.6)	1,150 - 124
40 Motor vehicles	11	3,308.4	58.9 - 9.0	3.8 - 1.3	270.0 - 28.2	2,463 - 475
45 Industrial & farm equipment	20	811.2	45.5 - (-7.3)	3.8 - 0.8	77.3 - 10.6	2,835 - 322
34 Metal products	8	164.8	29.3 - (-1.4)	2.4 - 0.6	47.9 - 6.6	1,205 - 384
32 Glass, concrete, abrasives, gypsum	8	143.1	30.7 - (-8.1)	4.9 - 0.8	59.5 - 11.9	1,150 - 124
26 Paper, fiber & wood products	15	185.2	52.6 - (-0.4)	2.1 - 0.2	42.8 - 3.4	1,217 - 106
43 Soaps, cosmetics	6	234.4	30.6 - 5.8	2.1 - 0.4	33.7 - 8.2	2,876 - 278
30 Rubber, plastic products	5	310.1	12.8 - 5	2.6 - 0.8	189.7 - 15.1	1,235 - 438
49 Beverages	2	12.9	20.8 - 0	0.3 - 0.2	8.9 - 3.4	321 - 222
22 Textiles, vinyl flooring	6	43.6	21.4 - 0.0	2.5 - 0.2	67.1 - 5.6	1,172 - 73
21 Tobacco	2	19.2	5.1 - (-1.0)	0.5	157.5 - 9.5	482 - 279
37 Shipbuilding, railroad & transportation equipment	4	63.9	42.2 - 1.9	1.[illegible] - 0.4	33.1 - 10.7	467 - 2[illegible]
10 Mining, crude oil production	4	87.1	17.4 - (-10.2)	1.3 - 0.4	26.6 - 5.3	1,150 - 378
47 Musical instruments, toys & sporting goods	1	34.8	8.4 - 0.4	3.2 - 0.8	68.2 - 22.5	1,471 - 318
GRAND TOTAL	259	15,525.7				

*[illegible], July 1, 1978

Table g. Mean (Average) Research and Development Expense of Those 1978 FORTUNE 500 Corporations with Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Data for Line 2 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent change from 1976	R & D Expense* Percent of sales	Percent of profits	Dollars per employee
28 Chemicals	36	45.719	11.772	2.138	44.58	1,704.94
36 Electronics, appliances	23	72.46	16.94	3.14	83.86	1,183.78
29 Petroleum refining	16	50.368	8.99	.387	6.99	1,111.06
42 Pharmaceuticals	17	73.97	10.723	5.417	56.888	2,804.29
41 Aerospace	11	93.15	15.14	2.89	78.18	1,405.36
44 Office equipment	10	194.16	17.86	4.44	71.46	1,733.70
20 Food	27	11.477	15.788	.37	15.529	413
38 Measuring, scientific, photographic equipment	14	85.192	16.77	5.204	77.292	2,180.71
33 Metal manufacturing	11	22.036	11.27	.854	423.954	513.81
40 Motor vehicles	11	300.76	24.27	2.24	73.65	1,307.91
45 Industrial & farm equipment	20	40.56	13.81	1.83	44.71	1,051.60
34 Metal products	8	20.6	11.087	1.25	33.275	652.50
32 Glass, concrete, abrasives, gypsum	8	17.89	10.59	1.38	23.09	613.38
26 Paper, fiber & wood products	15	12.346	14.92	.96	19.353	597.33
43 Soaps, cosmetics	6	39.066	14.466	1.183	17.433	931.16
30 Rubber, plastic products	5	62.02	8.7	1.72	73.62	824.80
49 Beverages	2	6.45	10.4	.25	6.15	271.50
22 Textiles, vinyl flooring	6	7.266	6.766	.816	19.483	432.66
21 Tobacco	2	9.6	2.05	.5	83.5	380.50
37 Shipbuilding, railroad & transportation equipment	4	15.975	13.05	.775	22.225	349
10 Mining, crude oil production	4	21.775	7.25	.725	12.675	715.25
47 Musical instruments, toys & sporting goods	3	19.266	4.533	2.166	52.633	924.33
GRAND TOTAL	259					
MEAN OF MEANS		55.5	12.23	1.85	61.16	1,005.65

*BW, July 1, 1978

Table 9

(Data for Line #3 in Fig. 2 in JASIS Article)

Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations without Libraries

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	R & D Expense *' Percent change from 1976 (range)	Percent of sales (range)	Percent of profits (range)	Dollars per employee (range)
36 Electronics, appliances	7	90.6	24.1 - 12.5	2.0 - 0.7	43.5 - 12.7	1,240 - 310
41 Aerospace	1	9.7	22	2.3	37.9	1,064
44 Office equipment	1	19.2	37.8	4.3	56.4	2,178
20 Food	2	9	17.8 - N.A.	.02	9.3 - 8.0	233 - 93
38 Measuring, scientific, photographic equipment	1	3.2	.4	.9	27.6	321
33 Metal manufacturing	6	18	6.2 - (-16.5)	0.5 - 0.2	13.5 - 8.1	264 - 176
40 Motor vehicles	7	99.9	30.0 - 7.5	1.9 - 0.7	1411.9 - 16.3	1,487 - 267
43 Industrial & farm equipment	21	166.6	33.3 - (-33.0)	2.7 - 0.3	73.3 - 3.7	2,333 - 146
34 Metal products	10	83.1	34.3 - (-12.1)	2.0 - 0.3	41.5 - 5.6	1,081 - 134
32 Glass, concrete, abrasives, gypsum	1	1.5	6.4	0.2	4	111
26 Paper, fiber & wood products	4	47.8	64.5 - (-6.5)	1.0 - 0.8	33.3 - 10.8	655 - 413
30 Rubber, plastic products	1	7.6	15.5	1.3	56.1	653
22 Textiles, vinyl flooring	1	4.9	-1.8	1.2	28.3	394
37 Shipbuilding, railroad & transportation equipment	1	3.2	28	.9	34.5	395
47 Musical instruments, toys & sporting goods	1	11.7	14.1	2.7	53.4	852
25 Furniture	1	5.8	12.8	0.9	53.8	342
GRAND TOTAL	66	583.8				

*BW, July 1, 1978

Table 10. Mean (Average) Research and Development Expense of Those 1978 FORTUNE 500 Corporations without Libraries

(Data for Line #4 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent change from 1976	R & D Expense * Percent of sales	Percent of profits	Dollars per employee
36 Electronics, appliances	7	12.94	16.94	2.16	63.47	618.43
41 Aerospace	1	9.7	22	2.3	37.9	1,064
44 Office equipment	1	19.2	37.8	4.3	56.4	2,178
20 Food	2	4.5	8.9	.2	8.65	163
38 Measuring, scientific, photographic equipment	1	3.2	.4	.9	27.6	321
34 Metal manufacturing	6	3	21.55	.43	12.86	217.66
40 Motor vehicles	7	14.27	15.41	.91	377.0	671.71
45 Industrial & farm equipment	21	7.93	12.8	1.39	26.9	746.57
34 Metal products	10	8.31	15.74	1.02	20.36	551.30
32 Glass, concrete, abrasives, gypsum	1	1.3	6.4	.2	4	111
26 Paper, fiber & wood products	4	11.93	15.77	.72	24.35	411.75
30 Rubber, plastic products	1	7.6	15.8	1.3	56.1	633
22 Textiles, vinyl flooring	1	4.9	-1.8	1.2	28.3	394
37 Shipbuilding, railroad & transportation equipment	1	5.2	28	.9	34.5	595
47 Musical instruments, toys & sporting goods	1	11.7	14.1	2.7	53.4	852
25 Furniture	1	3.8	12.8	.9	53.8	342
GRAND TOTAL	66					
MEAN OF MEANS		8.23	15.16	1.34	55.36	618.15

*BW, July 1, 1978

Table 11 Comparative R&D Expense of FORTUNE 500 Corporations With and Without Libraries and BUSINESS WEEK 600 Corporations not Listed in FORTUNE 500

(All figures are in $ Millions)

FORTUNE Group # '78	'75	Industry Name	1978 (With) Total	Mean	1978 (Without) Total	Mean	1975 (With) Total	Mean	1975 (Without) Total	Mean	1976 BW Equivalents Total	Mean
28	16	Chemicals	1646	46	----------		1376	51	17	6	43	4
36	13	Electronics, appliances	1667	72	91	13	1685	65	103	11	188	5
29	44	Petroleum refining	806	50	----------		745	44	----------		98	11
42	33	Pharmaceuticals	1257	74	----------		1164	65	----------		107	8
41	11	Aerospace Aircraft	1025	93	10	10	986	70	----------		3	2
44	30	Office equipment Office machinery	1942	194	19	19	1642	182	58	58	89	5
20	18	Food	310	11	9	5	277	12	25	6	12	2
38	23	Meas.,sci.,photo equipment	1193	85	3	3	847	109	3	3	127	4
33	24	Metal manufacturing	242	22	18	3	233	21	18	3	11	4
40	28	Motor vehicles	3308	301	100	14	2806	311	91	15	29	4
45	17	Industrial & farm equipment	811	41	167	8	622	37	130	7	67	3
34	25	Metal products	165	21	83	8	167	21	27	4	52	2
32	20	Glass, concrete	143	18	2	2	228	19	1	1	26	3
26	31	Paper, fiber	185	12	48	12	147	11	16	4	4	2
43	37	Soaps, cosmetics	234	39	----------		205	34	----------		29	5
30	35	Rubber, plastics	310	62	8	8	285	57	7	7	22	3
49	14	Beverages	13	6	----------		11	6	----------		----------	

Table 11 Comparative R&D Expense of FORTUNE 500 Corporations With amd Without Libraries and BUSINESS WEEK 600 Corporations not Listed in FORTUNE 500 (Continued)

(All figures are in $ Millions)

FORTUNE Group # '78	'75	Industry Name	1978 (With) Total	Mean	1978 (Without) Total	Mean	1975 (With) Total	Mean	1975 (Without) Total	Mean	1976 BW Equivalents Total	Mean
22	38	Textiles	44	7	5	5	11	3	10	5	8	2
21	39	Tobacco	19	10	----------		19	10	----------		----------	
37	36	Shipbuilding	64	16	5	5	12	6	4	4	----------	
10	26	Mining, crude oil	87	22	----------		4	4	----------		27	4
47	29	Musical instruments	55	18	12	12	10	10	33	16	33	3
25	27	Furniture	----------		6	6	----------		----------		----------	
		Misc. Manufacturing	----------		----------		25	25	----------		837	--
		Grand Total	15526		584		13534		544		1809	
		Mean of Means		55.5		8		51.2		10		10

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Table 12 Comparative R&D Expense of FORTUNE 500 Corporations With and Without Libraries and BUSINESS WEEK 600 Corporations not Listed in FORTUNE 500

(All figures are $ expended per employee per year)

FORTUNE Group # '78	'75	Industry Name	1978 (With) Mean	1978 (Without) Mean	1975 (With) Mean	1975 (Without) Mean	1976 BW Equivalents Mean
28	16	Chemicals	1705	----	1965	841	2184
36	13	Electronics, appliances	1184	618	1154	642	1124
29	44	Petroleum refining	1111	----	1018	----	503
42	33	Pharmaceuticals	2804	----	2572	----	2241
41	11	Aerospace aircraft	1405	1064	1157	----	699
44	30	Office equipment Office machinery	1734	2178	1566	2336	1526
20	18	Food	413	163	403	193	853
38	23	Meas.,sci., photo equipment	2181	321	2221	326	1417
33	24	Metal manufacturing	516	218	585	184	977
40	28	Motor vehicles	1308	672	1254	746	675
45	17	Industrial & farm equipment	1052	747	1028	673	957
34	25	Metal products	653	551	611	433	650
32	20	Glass, concrete	613	111	737	109	1293
26	31	Paper, fiber	597	412	532	328	902
43	37	Soaps, cosmetics	931	----	854	----	1631
30	35	Rubber, plastics	825	653	760	591	690
49	14	Beverages	272	----	244	----	----

Table 12 Comparative R&D Expense of FORTUNE 500 Corporations With and Without Libraries and BUSINESS WEEK 600 Corporations not Listed in FORTUNE 500 (Continued)

(All figures are $ expended per employee per year)

FORTUNE Group # '78	'75	Industry Name	1978 (With) Mean	1978 (Without) Mean	1975 (With) Mean	1975 (Without) Mean	1976 BW Equivalents Mean
22	38	Textiles	453	394	93	370	717
21	39	Tobacco	381	----	547	----	----
37	36	Shipbuilding	349	595	280	510	----
10	26	Mining, crude oil	715	----	722	----	1148
47	29	Musical instruments	924	852	316	946	868
25		Furniture	----	342	----	----	----
	27	Misc. manufacturing	----	----	1065	----	----
		Grand Total					
		Mean of Means	1006	618	942	615	1074

Table 13 Names of 1978 FORTUNE 500 Corporations without Libraries

FORTUNE Industry Group # & Name	
36 Electronics, appliances	Champion Sparkplug; Eltra; Emerson Electric; McGraw-Edison; Scovill; Sunbeam; National Semiconductor
41 Aerospace	Beech Aircraft
44 Office equipment	Memorex
20 Food	Consolidated Foods; George A. Hormel
38 Measuring, scientific, photographic equipment	Tally Industries
33 Metal manufacturing	IC Industries; Revere; Amsted; H. K. Porter; Tyler; Keystone
40 Motor vehicles	American Motors; Arvin Industries; Dana; Federal-Mogul; Fruehauf; Sheller-Globe; White Motor
45 Industrial & farm equipment	American Hoist & Derrick; Baker International; Black & Decker; Briggs & Stratton; Bucyrus-Erie; Cooper Industries; Envirotech; Ex-Cell-O; Gardner-Denver; General-Signal; Harnischfeger; Hobart; Houdaille Industries; Hughes Tool; Joy Mfg.; Koehring; Peabody Int'l; Roper; Tecumseh; U.S. Filter; Walter Kidde
34 Metal products	Continental Group; Chromalloy American; Stanley Works; Norris Industries; Parker-Hannifin; Signode; Wallace Murray; Masco; Butler; H. H. Robertson
32 Glass, concrete, abrasives, gypsum	National Gypsum
26 Paper, fiber & wood products	Bemis; Maryland Cup; Masonite; Saxon Ind.
30 Rubber, plastic products	Dayco

Table 13 Names of 1978 FORTUNE 500 Corporations without Libraries

FORTUNE Industry Group # & Name	
22 Textiles, vinyl flooring	Fieldcrest
37 Shipbuilding, railroad & transportation equipment	Fleetwood
47 Musical instruments, toys & sporting goods	Mattel
25 Furniture	Mohasco

APPENDIX

Table 1a. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data For Line #5 in Fig. 1, BASIS Article)

R & D Expense

BW, June 27, 1977

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	Percent of Sales	Percent of Profits	Dollars per Employee
16 CHEMICALS	27	1,376.7	21.6 - (-26.4)	4.2 - 0.8	315.1 - 15.9	4,789 - 471
Airco		12.8	-1.5	1.5	23.7	882
Air Products & Chemicals		18.8	17.4	2.3	29.6	1403
Akzona		17.7	6.5	2.4	315.1	1133
Allied Chemical		42.3	20.2	1.6	33.5	1265
American Cyanamid		83.2	14.6	4.0	61.3	2113
Cabot		13.3	3.2	2.9	45.4	2383
Celanese		70.0	9.4	3.3	101.5	2187
Chemetron		8.0	23.4	1.7	39.7	860
Dow Chemical		187.3	12.0	3.3	30.6	3537
E.I. Du Pont De Nemours		352.5	5.0	4.2	76.7	2656
Diamond Shamrock		24.0	23.0	1.8	17.2	2283
Ethyl		24.8	34.0	2.2	33.9	1549
Ferro		10.0	21.6	2.6	49.7	1272
Grace (W.R.)		28.3	1.4	0.8	21.4	474
Hercules		35.4	17.9	2.2	33.1	1477
Koppers		10.6	23.4	0.9	15.9	592
Lubrizol		17.0	2.6	3.8	33.4	4789
Monsanto		111.2	-3.9	2.6	30.4	1796
M L Industries		15.2	-26.4	1.2	25.7	689
Olin		24.7	4.2	1.8	34.1	1123
Pennwalt		18.7	19.3	2.4	53.7	1348
Rohm & Haas		47.7	6.3	4.5	101.5	3396
SCM		14.0	-26.3	1.1	46.1	317
Sherwin-Williams		9.6	NA	1.0	32.3	471
Stauffer Chemical		28.9	21.3	2.6	25.6	2219
Union Carbide		142.4	18.5	2.2	32.3	1259
Witco Chemical		8.1	3.8	1.4	35.1	1615
16 CHEMICALS (without libraries)	3	17.1	48.2 - 1.2	1.3 - 0.6	35 - 19	863 - 821
Clorox		5.2	17.2	0.6	19.0	863
Inmont		7.0	-1.2	1.3	35.0	821
Reichhold Chemicals		4.9	48.2	0.6	30.4	840

Table 3b. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #5 in Fig. 1, JASIS Article)

R & D Expense

BW, June 27, 1977

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	Percent of Sales	Percent of Profits	Dollars per Employee
13 APPLIANCES, ELECTRONICS	26	1,685.4	87.9 - (-21.8)	9.9 - (0.8)	266.7 - 18.2	3,372 - 204
AMP		47.0	20.5	9.0	90.3	3372
Bendix		100.5	19.8	3.4	96.0	1261
Bunker Ramo		3.5	-20.0	1.1	46.6	379
Cutler-Hammer		14.6	12.8	3.3	79.3	1009
Fairchild Camera & Instrument		44.0	25.7	9.9	266.7	2067
General Electric		411.5	15.2	2.6	44.2	1083
Gould		43.4	87.9	3.5	65.8	1228
Harris		20.0	-5.8	3.9	74.5	1587
Hewlett-Packard		107.6	20.0	9.7	118.4	3341
Hoover		4.7	8.4	0.8	68.2	204
Intl. Telephone & Telegraph		246.3	12.5	2.1	50.4	657
Lear Siegler		7.3	-21.8	1.0	18.6	431
Motorola		101.5	3.1	6.8	115.6	1813
North American Phillips		25.2	7.5	1.5	43.9	769
RCA		111.9	-1.5	2.1	63.1	1017
Raytheon		46.9	10.7	1.9	55.0	885
Singer		20.1	8.1	0.9	33.9	237
Square D		9.0	12.9	1.7	20.3	514
Studebaker-Worthington		18.0	23.2	1.5	36.1	772
Teledyne		24.6	16.3	1.3	18.2	523
Texas Instruments		72.2	42.5	4.4	74.2	1092
Varian Associates		21.6	15.9	6.3	228.8	2022
Westinghouse Electric		141.0	8.5	2.3	63.2	876
Whirlpool		26.4	7.1	1.7	30.4	1171
White Consolidated Industries		10.0	0.0	0.8	19.4	384
Zenith Radio		30.6	10.2	3.1	79.3	1310
13 APPLIANCES, ELECTRONICS (w/o Lib.)	9	102.6	57.3 - (-3.3)	3.7 - 0.5	192.8 - 9.0	1553 - 212
Champion Spark Plug		5.6	7.7	1.1	12.4	424
Eltra		13.0	39.6	1.6	31.9	523
Emerson Electric		30.0	20.0	2.0	25.7	773
Foddero		3.5	57.3	1.2	192.8	493
General Signal		22.6	6.6	3.7	72.1	1553
McGraw-Edison		5.1	-3.3	0.5	9.0	212
Roper		6.3	18.4	1.8	33.9	1073
Scovill Mfg.		17.6	0.7	0.7	20.1	273
Sunbeam		12.0	8.6	1.3	35.7	435

Table 1a. Total Research and Development Expenses of Those 1975 FORTUNE 500 Corporations A-4

(Back-up Data for Line #5 in Fig. 1, JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	R & D Expenses BW, June 27, 1977 Percent of Sales	Percent of Profits	Dollars per Employee
32 PETROLEUM REFINING	16	744.7	51.9 - (-37.3)	0.7 - 0.2	17.6 - 3.2	2,020 - 377
Ashland Oil		11.5	16.8	0.3	8.4	NA
Atlantic Richfield		33.0	17.0	0.4	5.7	1222
Cities Service		10.4	-6.3	0.3	4.8	591
Continental Oil		23.7	-37.3	0.3	5.2	540
Exxon		202.0	8.0	0.4	7.6	1603
Gulf Oil		64.0	6.7	0.4	7.8	1201
Kerr-McGee		4.3	51.9	0.2	3.2	7
Marathon Oil		11.2	6.7	0.3	5.7	866
Phillips Petroleum		40.2	19.5	0.7	9.8	1447
Shell Oil		65.1	14.8	0.7	9.2	2020
Standard Oil (Calif.)		76.1	9.2	0.4	8.6	1982
Standard Oil (Indiana)		67.1	13.0	0.6	7.5	1478
Standard Oil (Ohio)		10.5	13.2	0.4	7.7	498
Sun		24.9	6.0	0.5	7.0	767
Texaco		52.0	4.0	0.2	6.0	715
Union Oil (Calif.)		16.1	-8.0	0.3	6.0	1027
Occidental Petroleum		32.6	29.2	0.6	17.6	970
33 PHARMACEUTICALS	18	1,164.4	26.0 - (-6.4)	9.0 - 2.4	194.0 - 2.4	5,058 - 1,263
Abbott Laboratories		59.6	17.7	5.5	64.4	2340
American Home Products		60.1	7.9	2.4	21.6	1263
Baxter Travenol Laboratories		33.8	26.0	5.0	56.0	1343
Bristol-Myers		69.0	9.5	3.5	44.0	2232
Johnson & Johnson		112.5	15.0	4.5	54.8	1944
Eli Lilly		113.0	8.4	8.4	56.5	4852
Merck		136.4	9.5	8.2	53.4	4958
Miles Laboratories		24.1	15.5	5.4	148.2	2834
Morton-Norwich Products		15.6	18.0	2.8	194.0	1419
Pfizer		88.1	11.6	4.7	55.1	2197
Richardson-Merrell		31.1	1.2	4.2	64.4	2132
Schering-Plough		33.9	13.6	6.2	34.3	3225
G.D. Searle		32.6	-6.4	6.9	85.4	2503
Smithkline		54.8	4.3	8.1	76.0	3830
Squibb		49.7	1.6	4.1	45.9	1460
Sterling		36.3	14.9	3.3	43.8	1306
Upjohn		92.6	18.0	9.0	119.1	5038
Warner-Lambert		78.9	6.4	3.4	49.4	1360

Table 1a. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #5 in Fig. 1, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	R & D Expense BW, June 27, 1977 Percent of Sales	Percent of Profits	Dollars per Employee
11 AIRCRAFT	14	986.2	64.1 - (-48.5)	6.9 - 0.7	227.7 - 24.2	2,921 - 256
Avco		12.2	1.6	2.0	25.3	532
Boeing		191.0	1.6	4.9	185.6	2921
Cessna Aircraft		22.9	12.7	4.7	77.2	1543
General Dynamics		24.0	14.9	0.9	24.2	336
Grumman		19.6	64.1	1.3	72.2	700
Lockheed Aircraft		54.1	16.8	1.7	139.8	982
Martin Marietta		22.9	10.6	1.9	29.0	1041
McDonnell Douglas		105.6	-20.1	3.8	97.0	1823
Northrop		25.8	16.5	2.0	71.0	1073
Rockwell International		86.3	10.9	1.7	71.3	725
Rohr Industries		2.7	-48.5	0.7	NM	256
Textron		53.9	7.0	2.1	44.5	842
Thiokol		6.8	27.5	1.9	33.7	770
United Technologies		358.4	10.8	6.9	227.7	2637
30 OFFICE MACHINERY	9	1,641.5	19.3 - (14.1)	6.2 - 1.7	58.1 - (-14.1)	3,466 - 611
Addressograph-Multigraph		15.8	-14.1	2.8	246.4	804
Burroughs		107.9	6.9	5.8	58.1	2164
Control Data		58.9	19.5	4.4	124.0	1416
Honeywell		125.6	3.2	5.0	119.3	1774
Intl. Business Machines		1012.0	7.0	6.2	42.2	3466
Litton Industries		56.7	5.1	1.7	203.3	611
NCR		94.3	10.9	4.1	104.7	1407
Pitney-Bowes		11.4	9.1	2.1	37.0	628
Sperry Rand		158.9	-2.8	5.0	109.4	1825
Digital Equipment		58.4	20.3	7.9	79.5	2336
30 OFFICE MACHINERY (w/o libraries)	1	58.4	20.3	7.9	79.5	2336
18 FOOD	23	277.3	45.1 - (-4.9)	1.3 - 0.2	95.8 - 4.8	1,170 - 211
Amstar		2.1	20.6	0.2	4.8	260
Anderson Clayton		2.8	-5.1	0.4	8.1	194
Borden		14.8	8.3	0.4	13.1	385
CPC International		24.5	12.9	0.9	20.1	576
Campbell Soup		13.8	8.3	0.8	13.7	412
Carnation		7.3	10.6	0.3	7.0	329
Central Soya		3.2	14.3	0.2	8.3	347
Esmark		11.8	140.8	0.2	14.3	251
General Foods		37.8	21.0	1.0	25.2	805
General Mills		25.7	12.2	1.0	25.6	496
Green Giant		2.1	-4.9	0.5	36.6	289

Table 1a. Total Research and Development Expenses of Those 1975 FORTUNE 500 Corporations A-6

(Back-up Data for Line #5 in Fig. 1, JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	R & D Expenses in %, June 27, 1977 Percent of Sales	Percent of Profits	Dollars per Employee
18 FOOD (cont.)	23	277.3	45.1 - (-4.9)	1.3 - 0.2	95.8 - 4.8	1,170 - 211
H.J. Heinz		9.6	16.5	0.5	12.9	294
Hershey Foods		2.1	5.7	0.4	4.9	297
Kraft		13.0	19.8	0.3	9.6	272
LTV		29.4	38.8	0.7	95.8	535
Oscar Mayer		3.7	23.8	0.3	11.1	277
Nabisco		10.1	6.8	0.5	13.1	211
Norton Simon		7.1	4.9	0.4	7.7	273
Pillsbury		10.3	39.2	0.7	20.8	274
Quaker Oats		19.0	12.5	1.3	35.7	790
Ralston Purina		16.4	45.1	0.5	13.0	278
A.E. Staley Manufacturing		4.7	-5.1	0.6	12.5	1170
Standard Brands		6.0	0.1	0.3	5.9	283
18 FOOD (without libraries)	4	24.9	16.0 - 0.3	1.2 - 0.1	18.5 - 5.7	379 - 78
Consolidated Foods		5.9	12.3	0.2	7.7	78
Kellogg		7.5	16.0	0.5	5.7	379
Del Monte		9.9	9.7	0.7	18.5	130
Geo. A. Hormel		1.8	0.3	0.1	10.8	184
23 MEASURING, SCIENTIFIC, PHOTOGRAPHIC EQUIPMENT	8	874.0	20.8 - 3.8	6.5 - 3.1	221.9 - 46.5	5,348 - 933
Bausch & Lomb		10.7	12.9	3.1	51.7	933
Becton, Dickinson		20.1	12.5	3.9	49.4	1196
Bell & Howell		28.3	11.1	6.5	221.9	2192
Eastman Kodak		335.5	7.2	6.2	51.6	2642
Minnesota Mining & Mfg.		157.5	9.8	4.5	46.5	1981
Polaroid		77.6	20.8	8.2	97.4	5348
Sybron		18.6	3.8	3.2	68.5	1158
Xerox		225.7	13.6	5.1	62.9	2319
23 MEASURING, SCIENTIFIC, PHOTOGRAPHIC EQUIPMENT (without libraries)	1	3.2	0.2	0.9	31.1	326
Talley		3.2	0.2	0.9	31.1	326
24 METAL MANUFACTURING	11	232.5	4099 - (-16.4)	1.7 - 0.3	184.0 - 10.4	1,130 - 203
Allegheny Ludlum Industries		9.2	32.3	1.0	29.8	568
Aluminum Co. of America		47.6	-1.0	1.6	33.1	1099
Asarco		4.4	-16.4	0.4	10.4	337
Bethlehem Steel		43.7	16.2	0.8	26.0	416
General Cable		3.1	40.9	0.9	18.4	203
Kaiser Aluminum & Chemicals		13.2	8.2	0.7	21.0	329
Kennecott Copper		16.2	34.0	1.7	184.0	999
Lykes		4.3	6.5	0.3	22.4	186
Reynolds Metals		22.4	5.2	1.1	29.8	435
U.S. Steel		32.2	23.7	0.6	12.7	313

Table 1a. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #5 in Fig. 1, JASIS Article)

R & D Expenses

BW, June 27, 1977

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	Percent of Sales	Percent of Profits	Dollars per Employee
24 METAL MANUFACTURING (without libraries)	7 - 8	17.5	115.3 - (-9.4)	0.9 - 0.3	99.1 - 4.4	290 - 104
Amax		16.2	-10.5	1.4	10.8	1130
Amsted Industries		2.9	-9.4	0.6	8.5	290
Chromalloy American		2.6	74.7	0.3	9.3	104
Keystone Consolidated Industries		1.2	9.2	0.4	17.2	157
H.K. Porter		2.3	115.3	0.6	19.6	269
Revere Copper & Brass		1.6	8.0	0.3	99.1	222
Signode		3.9	-1.6	0.9	15.5	NA
St. Joe Minerals		3.0	-7.6	0.4	4.4	243
28 MOTOR VEHICLES	9	2,806.1	40.9 - 2.7	3.4 - 1.3	130.3 - 27.7	2,084 - 421
Borg-Warner		44.2	4.7	2.4	54.1	1157
Chrysler		280.4	40.9	1.8	85.5	1145
Eaton		28.5	9.5	1.6	31.3	622
Ford Motor		934.9	23.7	3.2	94.1	2084
General Motors		1257.3	12.9	2.7	43.3	1681
Intl. Harvester		140.0	7.3	2.6	80.6	1435
Signal		83.7	36.4	3.4	130.3	1978
A.O. Smith		10.2	20.0	1.6	65.3	761
TRW		36.9	2.7	1.3	27.7	421
28 MOTOR VEHICLES (without libraries)	6	91.1	32.8 - (-24.8)	1.7 - 0.7	157.5 - (-83.8)	1243 - 261
American Motors		38.8	6.2	1.7	-83.8	1243
Dana		16.5	22.2	1.1	18.5	676
Fruehauf		12.4	0.2	0.8	25.6	460
Houdaille Industries		5.7	7.5	1.7	23.0	792
Sheller-Globe		3.3	32.8	0.7	16.1	261
White Motor		12.4	-24.8	1.0	157.5	1046
17 FARM & INDUSTRIAL MACHINERY	17	622.2	53.2 - (-16.9)	4.1 - 0.6	131.1 - 12.0	2,415 - 232
A-T-O		5.5	53.2	1.1	41.6	307
Allis-Chalmers		45.2	12.7	3.0	77.0	1713
Babcock & Wilcox		27.4	14.6	1.6	51.6	695
Carrier		26.3	8.3	2.4	75.6	1071
Caterpillar Tractor		187.9	11.5	3.7	49.0	2415
Cincinnati Milacron		13.1	0.4	2.9	131.1	1053
Clark Equipment		13.3	-3.8	1.1	19.6	600
Deere		108.4	10.6	3.5	44.9	1942
Dresser Industries		21.5	27.2	1.0	13.7	409
FMC		34.1	16.6	2.5	47.2	1344
Foster Wheeler		5.8	14.0	0.6	27.6	349
Ingersoll-Rand		36.1	13.3	2.9	32.5	1226

Table 1a. Total Research and Development Expenses of Those 1975 FORTUNE 500 Corporations A-8

(Back-up Data for Line #5 in JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	R & D Expense as Percent of Sales	Percent of Profits	Dollars per Employee
17 FARM & INDUSTRIAL MACHINERY (cont.)	17	622.2	53.2 - (-16.9)	4.1 - 0.6	131.1 - 12.0	2,415 - 232
Midland-Ross		3.8	-16.9	0.9	16.9	464
Outboard Marine		19.4	20.1	3.3	70.9	1414
Sundstrand		24.6	9.2	4.1	75.2	1697
Timken		7.3	9.2	0.8	12.0	320
Wheelabrator-Frye		2.3	27.2	0.6	13.9	232
17 FARM & INDUSTRIAL MACHINERY (without libraries)	15	130.2	39.3 - (-20.9)	2.3 - 0.5	80.8 - 7.2	1592 - 236
American Hoist & Derrick		4.5	39.3	1.1	26.3	597
Black & Decker Mfg.		14.3	9.8	1.9	33.8	797
Briggs & Stratton		2.2	20.5	0.7	8.0	317
Cooper Industries		3.0	-20.9	0.5	7.2	247
Cummins Engine		33.3	15.0	3.2	36.8	1592
17 FARM & INDUSTRIAL MACHINERY (without libraries cont.)	15	130.2	39.3 - (-20.9)	2.3 - 0.5	80.8 - 7.2	1592 - 236
Ex-Cell-O		8.1	29.5	2.0	31.9	847
Federal Mogul		4.2	6.5	1.0	17.9	327
Gardner-Denver		10.1	4.3	2.3	30.7	882
Hobart		5.4	-3.3	1.3	24.3	452
Joy Mfg.		10.1	19.4	1.6	21.1	802
Walter Kidde		9.2	12.2	0.7	19.0	236
Koehring		7.1	-3.4	2.1	60.8	1275
Raymond		6.1	9.5	1.0	16.7	407
Tecumseh Products		4.2	13.0	0.7	12.1	313
Trane		8.4	14.9	1.9	41.5	811
25 METAL PRODUCTS	8	167.3	897.5 - 0.0	2.3 - 0.5	54.3 - 6.6	992 - 313
American Can		40.3	10.7	1.3	39.9	857
American Standard		16.1	0.0	1.0	22.7	360
Chicago Bridge & Iron		3.7	10.2	0.6	6.6	313
Colt Industries		15.2	14.3	1.2	24.7	568
Combustion Engineering		29.4	1.0	1.6	34.3	687
Eaton		21.7	897.5	2.0	49.3	660
Gillette		34.9	10.4	2.3	45.0	992
National Distillers & Chemical		6.0	11.1	0.5	6.6	449
25 METAL PRODUCTS (without libraries)	7	27	38.9 - (-17.0)	2.2 - 0.4	44.9 - 5.1	769 - 160
Tyler		1.5	15.1	0.4	7.7	237
H.H. Robertson		3.5	38.7	1.1	33.5	511
Parker-Hannifin		8.9	-4.8	2.2	44.9	701
Stanley Works		4.2	20.7	0.7	15.3	272
Harris Industries		1.5	-17.0	0.4	5.1	160
Wallace-Murray		4.0	37.9	1.2	20.6	382
Butler Mfg.		3.4	9.4	1.1	23.1	769

Table 1a. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Relates to Line 65, Fig. 1 in JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense, June 27, 1977: 1976 Millions of Dollars	Percent Change from 1975	Percent of Sales	Percent of Profits	Dollars per Employee
20 GLASS, [illegible]TE, ABRASIVES, GYPSUM	12	228.2	32.3 - (-6.4)	4.8 - 0.5	528.3 - 5.1	1,640 - 342
Anchor Hocking		6.5	16.0	1.0	23.7	365
Carborundum		8.8	32.3	1.4	26.7	509
Corning Glass Works		48.9	15.5	4.8	58.4	1640
GAF		18.0	17.6	1.7	91.1	876
General Refractories		4.7	18.2	1.4	528.3	545
Johns-Manville		11.5	4.3	0.9	21.7	464
Norton		7.4	-6.4	1.2	26.9	371
Owens-Corning Fiberglas		23.8	6.3	2.2	33.1	1322
Owens-Illinois		33.9	18.8	1.3	31.8	606
PPG Industries		36.3	12.8	2.5	37.2	1551
Vulcan Materials		1.9	25.2	0.5	5.1	351
U.S. Gypsum		6.5	10.3	0.7	17.7	342
20 GLASS, CONCRETE, ABRASIVES, GYPSUM (without libraries)	1	1.4	19.8	0.2	5.1	109
National Gypsum		1.4	19.8	0.2	5.1	109
21 PAPER, FIBER & WOOD PRODUCTS	13	147.1	44.4 - (-6.7)	4.8 - 0.5	64.8 - 3.4	1,272 - 94
Avery International		8.3	19.8	2.3	64.8	1272
Boise Cascade		3.3	44.3	0.2	3.4	94
Crown Zellerbach		9.2	14.4	0.4	9.4	289
Hammermill Paper		1.5	15.4	0.2	6.6	136
International Paper		20.1	21.8	0.6	7.9	384
Kimberly-Clark		21.8	10.9	1.4	17.9	787
Nashua		3.4	-6.7	1.5	63.2	901
Potlach		1.9	2.7	0.3	4.1	193
St. Regis Paper		7.6	2.3	0.5	8.3	270
Scott Paper		7.4	0.9	1.8	33.4	1185
Jim Walter		4.8	12.6	0.4	6.8	202
Westvaco		8.5	8.1	0.9	15.0	358
Weyerhaeuser		30.3	32.5	1.1	9.9	642
21 PAPER, FIBER & WOOD PRODUCTS (without libraries)	4	16.1	15.4 - (-2.4)	0.9 - 0.2	33.1 - 6.6	333 - 164
Bemis		3.2	8.9	0.9	33.1	391
Semon Industries		1.2	-2.4	0.2	27.9	164
Masonite		1.8	13.9	0.5	7.3	225
Union Camp		7.9	15.4	0.8	6.6	333

Table 1a. Total Research and Development Expense of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Relates to Line 95, Fig. 1 in JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	R & D Expense / Sales	R & D Expense / Profits	Dollars per Employee
				BW, June 27, 1977		
37 SOAPS, COSMETICS	5	205.4	26.7 - 5.7	2.1 - 0.4	34.1 - 8.0	2,627 - 393
Avon Products		13.5	5.7	0.9	8.0	509
Chesebrough-Pond's		6.3	24.4	0.8	11.6	393
Colgate-Palmolive		31.4	8.2	0.9	21.1	398
Proctor & Gamble		136.6	10.7	2.1	34.1	2627
Purex		1.8	9.3	0.4	8.6	239
Revlon		15.8	26.7	1.7	19.4	737
35 RUBBER, PLASTIC PRODUCTS	5	284.6	3.6 - (-41.1)	2.5 - 0.8	293.1 - 15.9	1,092 - 417
Firestone Tire & Rubber		53.4	3.6	1.4	55.7	473
General Tire & Rubber		16.7	-41.1	0.8	15.9	417
B.F. Goodrich		41.9	0.2	2.1	265.2	1068
Goodyear Tire & Rubber		113.6	-3.5	2.0	93.1	731
Uniroyal		59.0	3.5	2.5	293.1	1092
35 RUBBER, PLASTIC PRODUCTS (without libraries)	1	6.6	21.0	1.3	53.3	591
Dayco		6.6	21.0	1.3	53.3	591
14 BEVERAGES	2	10.9	34.1 - (-2.9)	0.3 - 0.2	3.4 - 3.2	279 - 210
Coca - Cola		9.2	34.1	0.3	3.2	279
Jos. Schlitz Brewing		1.7	-2.9	0.2	3.4	210
38 TEXTILES	4	11.3	5.1 - (-1.1)	0.5 - 0.2	10.8 - 3.7	145 - 68
Burlington Industries		5.0	0.0	0.2	4.8	71
Coone Mills		1.2	5.1	0.2	3.7	86
Hanes		2.0	-1.1	0.5	10.8	145
J.P. Stevens		3.1	3.9	0.2	7.6	68
38 TEXTILES (without libraries)	2	10.2	13.0 - 5.7	1.4 - 0.8	40.1 - 37.5	433 - 306
Fieldcrest Mills		5.0	13.0	1.4	40.1	433
Mohasco		5.2	5.7	0.8	37.5	306
39 TOBACCO	2	19.0	11.8 - (-0.2)	0.6 - 0.5	12.5 - 10.5	559 - 534
American Brands		13.2	-0.2	0.6	12.5	534
Liggett Group		3.8	11.8	0.5	10.5	559

Table 1a. Total Research and Development Expenses of Those 1975 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Relates to Line #5, Fig. 1 in JASIS Article)

R & D Expense

BW, June 27, 1977

FORTUNE Industry Group # & Name	# of Corps. Represented	1976 Millions of Dollars	Percent Change from 1975	Percent of Sales	Percent of Profits	Dollars per Employee
36 SHIPBUILDING, RAILROAD & TRANSPORTATION EQUIPMENT	2	11.6	34.4 - 17.0	0.6 - 0.4	25.7 - 11.1	291 - 269
ACF Industries		3.8	17.0	0.6	11.1	291
Pullman		7.8	34.4	0.4	25.7	269
36 SHIPBUILDING, RAILROAD & TRANSPORTATION EQUIPMENT (without libraries)	1	4.1	31.1	1.0	40.1	510
Fleetwood Enterprises		4.1	31.1	1.0	40.1	510
29 MUSICAL INSTRUMENTS, TOYS & SPORTING GOODS	1	9.5	9.5	0.9	25.0	316
AMF		9.5	9.5	0.9	25.0	316
29 MUSICAL INSTRUMENTS, TOYS & SPORTING GOODS	2	33.2	29.5 - 6.8	2.6 - 2.5	61.8 - 55.1	974 - 915
Brunswick		23.0	6.8	2.5	55.1	915
Mattel		10.2	29.5	2.6	61.8	974
27 MISCELLANEOUS MANUFACTURING	1	24.5	11.4	2.5	46.9	1,065
Armstrong Cork		24.5	11.4	2.5	46.9	1,065
26 MINING	1	3.6	-7.5	1.2	66.3	722
Cyprus Mines		3.6	-7.5	1.2	66.3	722

Table 7a. Total Research and Development Expenses of Those 1978 FORTUNE 500 Corporations A-12

(Back-up Data for Line #1 in Fig. 1, JANIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expenses a 1977 Millions of Dollars	Percent change from 1976	Percent of sales	Percent of profits	Dollars per employee
28 CHEMICALS	36	1,645.9	26.6 - (-3.4)	4.0 - 0.4	261.8 - (-109.7)	5,306 - 458
Airco		NA	NA	NA	NA	NA
Air Products & Chemicals		24.1	28.0	2.5	35.6	1757
Akzona		19.7	11.2	2.4	261.8	1266
Allied Chemical		53.4	26.3	1.8	38.6	1425
American Cyanamid		96.4	15.8	4.0	69.1	2203
Cabot		14.8	11.5	2.6	37.2	2651
Celanese		77.0	10.0	3.3	110.0	2399
Clorox		6.6	26.6	0.8	20.3	1093
Dow Chemical		203.3	8.5	3.3	36.6	3822
Dow Corning		NA	NA	NA	NA	NA
E.I. Du Pont De Nemours		366.8	4.1	3.9	67.3	2793
Diamond Shamrock		29.3	21.7	1.9	18.1	2593
Ethyl		27.6	11.3	2.2	35.4	1725
Ferro		11.4	14.7	2.7	54.7	1402
GAF		12.0	1.1	1.3	45.1	640
Grace (W.R.)		32.0	13.2	0.8	22.8	505
Hercules		37.4	5.6	2.2	64.5	1537
Inmont		NA	NA	NA	NA	NA
Koppers		11.5	8.4	0.8	17.3	632
Lubrizol		19.2	13.0	3.8	33.1	5306
Monsanto		132.3	15.7	2.9	48.0	2151
Morton-Norwich		16.5	5.8	2.7	52.1	1516
M & T Industries		18.0	20.0	1.1	27.1	732
Nalco Chemical		14.6	17.7	3.3	29.1	3516
National Distillers & Chemical		6.5	8.3	0.4	7.6	496
National Starch & Chemical		7.4	18.4	2.0	28.2	1920
Olin		25.1	1.5	1.7	32.1	1140
PPG Industries		60.6	7.6	2.4	66.1	1656
Pennwalt		20.9	11.5	2.5	50.1	1503
Reichold Chemicals		9.3	9.1	0.8	38.9	815
Rohm & Haas		45.4	6.5	4.0	99.5	3489
SCM		16.5	17.9	1.2	44.1	647
Sherwin-Williams		9.0	-3.4	0.9	-109.7	458
Stauffer Chemical		32.5	12.5	2.6	28.0	2501
Union Carbide		155.8	9.4	2.2	40.5	1371
Vitro Chemical		9.2	13.6	1.5	37.3	1793

*BW, July 1, 1978

Table 7a. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #1 in Fig. 1 & Line #4 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense, July 1, 1978: 1977 Millions of Dollars	Percent Change from 1977	Percent of Sales	Percent of Profits	Dollars per Employee
36 ELECTRONICS, APPLIANCES	23	1,666.5	37.1 - (-6.4)	9.5 - 0.8	421.5 - 14.9	3,847 - 235
AMP		58.0	23.4	9.2	76.4	3847
Cutler-Hammer		17.1	16.8	3.?	71.2	1140
Fairchild Camera & Instrument		43.6	1.4	9.5	390.6	2192
General Electric		463.5	12.6	2.6	42.6	1207
Gould		59.6	37.1	3.7	63.6	1604
Globe-Union		5.7	22.6	1.5	24.6	611
Harris		25.9	29.5	4.0	64.7	1579
Hoover		5.5	17.6	0.9	23.4	235
Intl. Telephone & Telegraph		665.8	17.8	1.5	41.0	722
P.R. Mallory		4.2	32.4	1.2	30.9	372
Motorola		109.7	13.8	5.9	103.3	1829
North American Phillips		30.0	19.0	1.6	49.0	865
RCA		126.5	13.0	2.2	31.2	1140
Raytheon		51.7	10.2	1.8	45.6	894
Singer		23.5	16.9	1.0	31.3	273
Square D		10.0	11.6	1.6	17.0	557
Teledyne		28.9	17.5	1.3	14.9	593
Texas Instruments		96.2	33.6	4.7	82.4	1403
Varian Associates		22.1	15.7	6.3	186.4	2162
Westinghouse Electric		132.0	-6.4	2.2	48.7	934
Whirlpool		29.2	10.9	1.5	26.6	1240
White Consolidated Industries		11.7	17.0	0.8	21.7	394
Zenith Radio		31.9	9.6	3.3	421.5	1334
36 ELECTRONICS, APPLIANCES (without libraries)	7	90.6	24.1 - (-1.3)	2.0 - 0.7	43.5 - (-26.6)	863 - 310
Champion Spark Plug		6.3	12.5	1.1	12.7	450
Eltra		15.5	19.2	1.7	36.5	710
Emerson Electric		37.0	19.4	2.0	26.0	863
McGraw-Edison		7.4	15.3	0.7	13.0	310
National Semiconductor		31.8	28.1	8.2	312.6	1470
Scovill Mfg.		NA	NA	NA	NA	NA
Sunbeam		14.8	24.1	1.4	43.5	526

Table 7a — Total Research and Development Expense of These 1978 FORTUNE 500 Corporations — A-14

(Back-up Data for Line 01 in Fig. 1, JASIS Article) — Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense FY, July 1, 1978: 1977 Millions of Dollars	Percent Change from 1977	Percent of Sales	Percent of Profits	Dollars per Employee
29 PETROLEUM REFINING	16	805.9	37.6 - (-8.0)	0.9 - 0.1	12.4 - 3.4	2,713 - 172
Ashland Oil		5.5	5.3	0.1	3.4	172
Atlantic Richfield		45.4	37.6	0.4	6.5	885
Cities Service		10.0	-3.8	0.2	4.8	553
Continental Oil		27.4	15.6	0.3	7.2	634
Exxon		230.0	13.9	0.4	9.5	1811
Gulf Oil		70.0	9.4	0.4	9.3	1179
Kerr-McGee		4.6	6.5	0.2	3.9	407
Marathon Oil		12.7	13.4	0.3	6.4	949
Phillips Petroleum		48.5	20.5	0.8	9.4	1709
Shell Oil		91.0	3.4	0.9	12.4	2713
Standard Oil (Calif.)		83.3	9.4	0.4	8.2	2173
Standard Oil (Indiana)		73.7	9.8	0.6	7.3	1579
Standard Oil (Ohio)		11.7	11.5	0.3	6.5	529
Sun		23.0	-8.0	0.4	6.4	711
Texaco		52.0	0.0	0.2	5.6	736
Union Oil (Calif.)		17.1	-0.6	0.3	5.1	1035
42 PHARMACEUTICALS	17	1,257.5	17.1 - 2.3	9.0 - 2.5	148.5 - 21.5	5,431 - 1,242
Abbott Laboratories		66.7	11.9	5.4	56.6	2554
American Home Products		65.9	9.6	2.5	21.5	1345
Baxter Travenol Laboratories		37.1	9.8	4.4	49.4	1242
Bristol-Myers		80.7	16.9	3.7	46.3	2602
Johnson & Johnson		131.8	17.1	4.5	53.3	2179
Eli Lilly		124.6	9.3	8.2	57.0	5236
Merck		144.9	8.3	8.4	52.2	5137
Miles Laboratories		NA	NA	NA	NA	NA
Morton-Norwich Products		16.5	5.8	2.7	52.1	1516
Pfizer		98.3	11.6	4.8	56.0	2445
Richardson-Merrell		33.9	8.8	4.1	59.2	2258
Schering-Plough		58.6	8.7	6.2	35.1	3425
G.D. Searle		52.6	11.8	7.0	148.5	2507
Smithkline		61.8	12.8	7.9	69.2	4082
Squibb		54.5	9.8	4.1	48.4	1557
Sterling		39.0	7.6	3.3	45.5	1427
Upjohn		102.3	10.3	9.0	111.7	5431
Warner-Lambert		80.7	2.3	3.2	43.0	1392

Table 7a. Total Research and Development Expenses of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #1 in Fig. 1 & Line #4 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent Change from 1977	R & D Expense BW, July 1, 1978 Percent of Sales	Percent of Profits	Dollars per Employee
41 AEROSPACE	11	1,024.6	37.1 - (-9.7)	6.6 - 0.4	187.9 - 5.9	2,904 - 238
Boeing		221.6	16.3	5.5	122.9	2904
Cessna Aircraft		31.4	37.1	5.1	85.0	1962
Grumman		17.7	-9.7	1.1	54.6	656
Lockheed Aircraft		56.6	4.6	1.7	102.2	1027
Martin Marietta		6.0	20.0	0.4	5.9	238
McDonnell Douglas		123.9	17.3	3.5	100.8	2012
Northrop		31.5	22.2	2.0	47.6	1201
Rockwell International		97.0	12.4	1.7	67.3	842
Textron		61.9	14.8	2.2	45.2	967
Thiokol		8.7	28.7	2.0	40.6	992
United Technologies		360.3	2.8	6.6	187.9	2858
41 AEROSPACE (without libraries)	1	9.7	22	2.3	37.9	1064
Beech Aircraft		9.7	22	2.3	37.9	1064
44 OFFICE EQUIPMENT	10	1,941.6	36.5 - 5.9	7.5 - 0.8	122.7 - (-34.4)	3,682 - 248
Addressograph-Multigraph		4.8	9.8	0.8	-34.4	248
Burroughs		122.4	13.4	5.9	56.9	2386
Control Data		73.1	24.3	4.9	117.2	1592
Digital Equipment		79.7	36.5	7.5	73.5	2218
Honeywell		152.3	21.3	5.2	113.4	2009
Intl. Business Machines		1142.0	12.8	6.3	42.0	3682
Litton Industries		68.6	21.0	2.0	122.7	730
NCR		118.1	25.3	4.7	82.2	1845
Pitney-Bowes		12.3	8.3	2.0	33.8	662
Sperry Rand		168.3	5.9	5.1	107.3	1965
44 OFFICE EQUIPMENT (without libraries)	1	19.2	37.8	4.3	56.4	2178
Memorex		19.2	37.8	4.3	56.4	2178
20 FOOD	27	309.9	51.8 - (-19.5)	1.2 - 0.2	35.6 - 5.4	1,135 - 145
Amstar		2.9	39.1	0.3	10.2	343
Anderson Clayton		3.0	6.4	0.3	7.7	193
Borden		16.3	10.1	0.5	12.8	431
CPC International		25.5	4.1	0.9	19.2	607
Campbell Soup		15.4	11.6	0.9	14.4	465
Carnation		9.5	30.1	0.4	8.7	425
Central Soya		4.4	33.3	0.2	35.6	464
Del Monte		11.0	11.1	0.7	21.6	145
Esmark		9.4	-4.0	0.2	14.0	209
General Foods		49.9	31.7	1.0	28.1	1039
General Mills		29.9	16.3	1.8	25.3	484
Gerber Products		3.5	11.2	0.9	13.9	487

Table 7a. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #1 in Fig. 1 & Line #4 in Fig. 3, JASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense By, July 1, 1978: 1977 Millions of Dollars	Percent Change from 1977	Percent of Sales	Percent of Profits	Dollars per Employee
20 FOOD (cont.)	27	309.9	51.8 - (-19.5)	1.2 - 0.2	35.6 - 5.4	1,135 - 145
Green Giant		2.6	21.7	0.6	23.4	337
H.J. Heinz		9.4	-1.8	0.5	11.2	285
Hershey Foods		2.7	20.5	0.4	7.5	351
Kellogg		7.7	2.7	0.5	5.6	377
Kraft		16.0	23.1	0.3	10.4	341
McCormick		1.7	24.6	0.5	11.6	344
Oscar Mayer		3.6	51.8	0.5	16.1	408
Nabisco		9.3	0.0	0.4	9.0	217
Norton Simon		8.4	17.6	0.5	8.2	193
Pillsbury		14.3	38.8	1.0	24.7	354
Quaker Oats		19.3	1.7	1.2	28.6	695
Ralston Purina		17.6	7.3	0.5	12.3	263
A.E. Staley Manufacturing		4.8	2.1	0.4	19.6	1129
Standard Brands		8.2	36.7	0.4	12.0	337
Wm. Wrigley Jr.		1.6	-19.5	0.4	5.4	275
20 FOOD (without libraries)	2	9	17.8 - NA	0.2	9.3 - 8.0	233 - 93
Consolidated Foods		7.0	17.8	0.2	8.0	93
Geo. A. Hormel		2.0	NA	0.2	9.3	233
38 MEASURING, SCIENTIFIC, PHOTOGRAPHIC EQUIPMENT	14	1,192.7	30.1 - 3.1	9.2 - 2.0	213.5 - 31.4	5,426 - 507
Bausch & Lomb		11.6	8.4	3.1	46.3	1077
Becton, Dickinson		26.0	25.7	4.4	55.9	1468
Bell & Howell		25.2	15.6	5.1	213.5	1951
EG&G		6.9	7.8	1.8	52.8	507
Eastman Kodak		351.1	4.7	5.9	54.6	2838
Foxboro		21.4	28.4	5.8	67.5	2175
Hewlett-Packard		125.4	16.5	9.2	103.2	3573
Johnson Controls		7.5	24.8	2.0	31.4	640
Minnesota Mining & Mfg.		177.0	12.4	4.4	42.9	2176
Perkin-Elmer		24.7	23.5	5.7	93.0	2227
Tektronix		38.7	30.1	8.5	87.9	2641
Polaroid		88.9	14.7	8.4	96.4	5426
Sybron		19.2	3.1	3.3	70.3	1243
Xerox		269.1	19.1	5.3	66.2	2588
38 MEASURING, SCIENTIFIC, PHOTOGRAPHIC EQUIPMENT (without libraries)	1	3.2	0.4	0.9	27.6	321
Talley Industries		3.2	0.4	0.9	27.6	321

Table 7a. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

(Back-up Data for Line #1 in Fig. 1 & Line #4 in Fig. 3, OASIS Article)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent Change from 1977	R & D Expense in, July 1, 1978 Percent of Sales	Percent of Profits	Dollars per Employee
11 METAL MANUFACTURING	11	242.4	145.2 - (-34.9)	1.5 - 2.0	4392.3 - (-83.6)	1,150 - 124
Allegheny Ludium Industries		10.7	16.9	1.1	42.1	424
Alluminum Co. of America		52.0	8.3	1.5	26.6	1150
Asarco		4.9	-10.6	0.5	-16.6	376
Bathlehem Steel		42.7	-2.3	0.8	-9.5	427
General Cable		7.6	145.2	1.2	37.3	475
Kaiser Aluminum & Chemicals		15.2	15.2	0.7	13.6	579
Kennecott Copper		13.6	-15.9	1.5	4592.3	798
LTV		19.1	-34.9	0.4	-83.6	363
Lykes		3.5	-18.5	0.2	-1.8	124
Reynolds Metals		23.3	4.0	1.0	27.0	638
U.S. Steel		49.8	-4.6	0.3	36.1	300
33 METAL MANUFACTURING (without libraries)	6	18	6.2 - (-16.5)	0.5 - 0.2	13.5 - 8.1	264 - 176
Amsted Industries		2.9	0.0	0.5	8.1	264
IC Industries		8.2	6.2	0.5	11.1	203
H.K. Porter		NA	NA	NA	NA	NA
Revere Copper & Brass		1.4	-16.5	0.2	13.5	176
Tyler		NA	NA	NA	NA	NA
40 MOTOR VEHICLES	11	3,308.4	58.9 - 9.0	3.8 - 1.3	270.0 - 28.2	2,465 - 475
Bendix		45.6	19.1	1.4	38.6	566
Borg-Warner		50.5	14.3	2.5	48.6	1285
Chrysler		337.0	20.4	2.0	270.0	1344
Cummins Engine		41.3	24.0	3.3	61.6	1877
Eaton		31.0	9.0	1.5	29.2	665
Ford Motor		1170.0	26.5	3.1	69.9	2441
General Motors		1451.4	15.4	2.6	43.5	1821
Lear Siegler		11.6	58.9	1.3	31.3	475
Signal		113.6	35.8	3.8	112.0	2465
A.O. Smith		12.8	25.5	1.8	77.3	948
TRW		63.6	18.1	1.3	28.2	500
40 MOTOR VEHICLES (without libraries)	7	99.9	30.0 - 7.5	1.9 - 0.7	1411.9 - 16.3	1467 - 267
American Motors		43.3	11.5	1.9	1411.9	1467
Arvin Industries		NA	NA	NA	NA	NA
Dana		20.5	24.2	1.1	19.0	782
Federal-Mogul		4.5	7.5	0.9	16.3	340
Fruehauf		14.7	19.2	0.8	24.2	502
Shaller-Globe		3.9	13.5	0.7	23.4	267
White Motor		13.0	30.0	1.0	1144.2	1344

Table 7a. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations A-18

(Back-up Data for Line #1 in Fig. 1& Line #4 in Fig. 3, JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense $M, July 1, 1978 1977 Millions of Dollars	Percent Change from 1977	Percent of Sales	Percent of Profits	Dollars per Employee
45 INDUSTRIAL & FARM EQUIPMENT	20	811.2	45.5 - (-7.3)	3.8 - 0.8	77.3 - 10.6	2,835 - 322
A-T-O		6.7	22.7	1.2	58.1	394
Allis-Chalmers		51.8	14.6	3.4	77.3	1916
Cameron Iron Works		3.5	22.2	1.3	17.9	660
Carrier		29.9	13.8	2.3	52.3	1196
Caterpillar Tractor		222.7	18.5	3.8	50.0	2835
Cincinnati Milacron		14.9	13.7	2.8	71.4	1145
Clark Equipment		15.9	19.5	1.2	26.4	760
Deere		137.5	26.8	3.8	53.8	2346
Dresser Industries		22.2	3.3	0.9	12.0	418
Emhart		24.1	11.3	2.0	40.6	739
FMC		54.2	2.0	2.4	42.7	1226
General Signal		24.5	1.5	2.8	51.1	1222
Houdaille Industries		6.6	15.8	1.7	24.4	857
Ingersoll-Rand		58.6	4.5	2.8	49.8	1243
Int. Harvester		114.6	17.0	1.9	56.9	1230
Midland-Ross		4.2	NA	0.9	16.6	424
Reanord		7.3	21.1	1.0	16.6	447
Studebaker-Worthington		19.7	11.3	1.5	28.7	843
Sundstrand		22.8	-7.3	3.5	64.6	1594
Timken		7.9	7.5	0.8	10.6	341
Wheelabrator-Frye		3.7	45.4	0.8	16.2	322
45 INDUSTRIAL & FARM EQUIPMENT (without libraries)	21	166.6	33.3 - (-33.0)	2.7 - 0.3	73.3 - 3.7	2,333 - 146
American Hoist & Derrick		4.8	5.0	1.3	30.9	692
Baker International		8.6	32.4	1.2	14.2	619
Black & Decker Mfg.		15.3	6.4	1.9	29.6	888
Briggs & Stratton		3.2	46.2	0.8	9.7	407
Bucyrus-Erie		14.4	5.1	2.6	27.3	2333
Cooper Industries		2.0	-33.3	0.3	3.7	146
Envirotech		11.0	53.3	2.4	63.4	1185
Ex-Cell-O		9.2	13.5	2.1	31.8	940
Gardner-Denver		7.1	8.2	1.4	30.1	593
Harnischfeger		12.7	24.5	2.7	58.1	1349
Hobart		6.4	17.8	1.3	25.9	492
Hughes Tool		3.8	7.4	0.8	8.8	390
Joy Mfg.		7.4	-26.5	1.1	15.3	571
Walter Kidde		11.9	29.3	0.8	21.0	290

Table 7a. Total Research and Development Expense of These 1978 FORTUNE 500 Corporations A-19

(Back-up Data for Line #1 in Fig. 1 & Line #4 in Fig. 3 in JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	R & D Expense FY, July 1, 1978 1977 Millions of Dollars	Percent Change from 1977	Percent of Sales	Percent of Profits	Dollars per Employee
45 INDUSTRIAL & FARM EQUIPMENT (without libraries cont. 2.)	21	166.6	53.3 - (33.0)	2.7 - 0.3	73.3 - 3.7	2,333 - 146
Koehring		7.7	8.0	2.1	73.3	1286
Peabody International		2.1	19.3	0.5	13.2	271
Tecumseh Products		5.2	22.7	0.8	13.3	492
Trane		9.0	8.2	1.9	36.2	853
U.S. Filter		2.7	12.3	0.6	19.7	455
Roper		NA	NA	NA	NA	NA
34 METAL PRODUCTS	8	164.8	29.3 - (-1.4)	2.4 - 0.6	47.9 - 6.6	1,205 - 384
American Can		36.5	7.7	1.1	33.6	748
Babcock & Wilcox		NA	NA	NA	NA	NA
Ball		4.7	10.1	1.1	30.2	570
Chicago Bridge & Iron		3.8	4.8	0.6	6.6	384
Colt Industries		17.7	14.2	1.2	25.4	574
Combustion Engineering		29.0	-1.4	1.4	43.2	648
Foster Wheeler		7.5	29.3	0.6	27.7	396
Gillette		38.2	9.4	2.4	47.9	1205
34 METAL PRODUCTS (without libraries)	9	83.1	54.3 - (-12.1)	1.0 - 0.3	41.5 - 5.6	1081 - 134
Butler Mfg.		3.0	-12.1	0.8	16.1	675
Chromalloy American		3.6	38.1	0.3	9.6	134
Continental Group		37.7	-6.5	1.0	26.2	655
Masco		8.1	5.3	1.8	16.3	1081
Norris Industries		2.3	54.3	0.4	5.6	228
Parker-Hannifin		10.3	15.1	2.0	36.4	303
Signode		4.8	21.3	1.0	15.9	736
Stanley Works		5.0	19.3	0.8	15.2	316
Wallace-Murray		4.7	17.5	1.0	20.8	432
32 GLASS, CONCRETE, ABRASIVES, GYPSUM	8	143.1	30.7 - (-8.1)	4.9 - 0.8	59.5 - 11.9	1809 - 370
Anchor Hocking		7.3	12.3	1.1	24.3	435
Carborundum		NA	NA	NA	NA	NA
Corning Glass Works		54.8	12.2	4.9	59.5	1809
Johns-Manville		12.2	5.6	0.8	11.9	479
Norton		10.2	17.0	1.2	24.6	450
Owens-Corning Fiberglas		19.9	30.7	1.3	17.7	904
Owens-Illinois		31.2	-8.1	1.1	34.1	460
U.S. Gypsum		7.5	15.0	0.6	12.6	370
32 GLASS, CONCRETE, ABRASIVES, GYPSUM (without lib.)	1	1.5	6.4	0.2	4.0	111
National Gypsum		1.5	6.4	0.2	4.0	111

Table 7a.

(Relates to Line #1 in Fig. 1 & Line 4 in Fig. 3 JASIS ARTICLE)

Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent Change from 1977	R & D Expense as of July 1, 1978: Percent of Sales	Percent of Profits	Dollars per Employee
26 PAPER, FIBER & WOOD PRODUCTS	15	185.2	52.6 - (-0.4)	2.1 - 0.2	42.8 - 3.4	1,217 - 106
Avery International		NA	NA	NA	NA	NA
Boise Cascade		4.0	20.4	0.2	3.4	106
Crown Zellerback		10.0	8.7	0.4	9.1	311
Dennison Mfg.		7.6	28.7	2.1	41.0	955
Hammermill Paper		1.6	6.7	0.2	8.2	140
International Paper		NA	NA	NA	NA	NA
Kimberly-Clark		23.1	6.0	1.3	17.7	809
Nashua		6.6	21.0	1.6	42.8	1072
Potlach		NA	NA	NA	NA	NA
St. Regis Paper		8.4	11.6	0.4	7.9	272
Scott Paper		25.9	6.2	1.7	41.7	1217
Union Camp		NA	NA	NA	NA	NA
Jim Walter		5.0	2.6	0.3	6.2	198
Westvaco		8.5	-0.4	0.8	13.7	534
Weyerhaeuser		46.3	52.6	1.4	15.2	964
26 PAPER, FIBER & WOOD PRODUCTS (without libraries)	4	47.8	64.5 - (-6.5)	1.0 - 0.8	33.3 - 10.8	655 - 413
Bemis		5.6	7.5	0.9	33.3	415
Maryland Cup		37.7	-6.5	1.0	26.2	656
Masonite		3.3	64.5	0.8	10.8	413
Saxon Industries		NA	NA	NA	NA	NA
43 SOAPS, COSMETICS	6	234.4	30.6 - 5.8	2.1 - 0.4	33.7 - 8.2	2,876 - 278
Avon Products		15.8	16.5	1.0	8.2	577
Chesebrough-Pond's		7.1	13.5	0.9	11.8	427
Colgate-Palmolive		33.6	6.7	0.9	20.9	634
Proctor & Gamble		155.3	13.7	2.1	33.7	2876
Purex		1.9	5.8	0.4	8.9	278
Revlon		20.7	30.6	1.8	21.1	795
30 RUBBER, PLASTIC PRODUCTS	5	310.1	12.8 - 5	2.6 - 0.8	189.7 - 15.1	1,235 - 438
Firestone Tire & Rubber		60.3	12.8	1.4	54.7	524
General Tire & Rubber		17.5	5.0	0.8	15.1	438
B.F. Goodrich		44.8	6.8	2.0	74.5	1132
Goodyear Tire & Rubber		122.5	7.0	1.8	59.1	795
Uniroyal		66.0	11.9	2.6	189.7	1235
30 RUBBER, PLACTIC PRODUCTS (without libraries)	1	7.6	15.5	1.3	56.1	653
Dayco		7.6	15.5	1.3	56.1	653
49 BEVERAGES	2	12.9	20.8 - 0	0.3 - 0.2	8.9 - 3.4	321 - 222
Coca-Cola		11.1	20.8	0.3	3.4	321
Jos. Schlitz Brewing		1.8	0.0	0.2	8.9	222
49 BEVERAGES (without libraries)	1					
Adolph Coors						

Table 7a. Total Research and Development Expense of Those 1978 FORTUNE 500 Corporations A-21

(Relates to Line 81 in Fig. 1 & Line 4 in Fig 3, JASIS Article) Having Libraries (Arranged by Number of Libraries in the Respective FORTUNE Groups)

FORTUNE Industry Group # & Name	# of Corps. Represented	1977 Millions of Dollars	Percent Change from 1977	R & D Expense BH, July 1, 1978 Percent of Sales	Percent of Profits	Dollars per Employee
22 TEXTILES, VINYL FLOORING	6	43.6	21.4 - 0.0	2.5 - 0.2	67.1 - 5.6	1,172 - 73
Armstrong Cork		27.1	10.7	2.5	67.1	1172
Burlington Industries		5.0	0.0	0.2	5.6	73
Cone Mills		NA	NA	NA	NA	NA
Congoleum		3.1	21.4	1.3	20.5	506
Hanes		NA	NA	NA	NA	NA
Mohasco		5.8	12.8	0.9	53.8	342
J.P. Stevens		3.2	4.5	0.2	9.2	734
22 TEXTILES, VINYL FLOORING (without libraries)	1	4.9	-1.8	1.2	28.3	394
Fieldcrest Mills		4.9	-1.8	1.2	28.3	394
21 TOBACCO	2	19.2	5.1 - (-1.0)	0.5	157.5 - 9.5	482 - 279
American Brands		15.1	-1.0	0.5	9.5	279
Liggett Group		4.1	5.1	0.5	157.5	482
37 SHIPBUILDING, RAILROAD & TRANSPORTATION EQUIPMENT	3	63.9	42.2 - 1.9	1.2 - 0.5	33.1 - 10.7	467 - 292
ACF Industries		3.9	1.9	0.5	10.7	292
American Standard		17.4	8.4	1.0	19.7	376
General Dynamics		34.2	42.2	1.2	33.1	467
37 SHIPBUILDING, RAILROAD & TRANSPORTATION EQUIPMENT (without libraries)	1	5.2	28.0	0.9	34.5	395
Fleetwood Enterprises		5.2	28.0	0.9	34.5	395
10 MINING, CRUDE OIL PRODUCTION	4	87.1	17.4 - (-10.2)	1.5 - 0.4	26.6 - 5.3	1,150 - 378
Amax		52.0	8.3	1.5	26.6	1150
Occidental Petroleum		29.3	-10.2	0.5	13.4	912
Vulcan Materials		2.2	13.5	0.4	5.4	378
St. Joe Minerals		3.6	17.4	0.5	5.3	421
47 MUSICAL INSTRUMENTS, TOYS & SPORTING GOODS	3	34.8	8.4 - 0.4	3.2 - 0.8	68.2 - 22.5	1,471 - 318
AMF		9.6	0.4	0.8	22.5	318
Brunswick		24.9	8.4	2.5	67.2	984
Outboard Marine		20.3	4.8	3.2	68.2	1471
47 MUSICAL INSTRUMENTS, TOYS & SPORTING GOODS (without Libs.)	1	11.7	14.1	2.7	53.4	852
Mattel		11.7	14.1	2.7	53.4	852